



TO STUDY THE ASSOCIATION BETWEEN GRADING OF OSTEOARTHRITIS KNEE & HYPERTENSION IN A TERTIARY CARE CENTER

Orthopaedic

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ABSTRACT

Objective: To study the association between severity of OA knee and Hypertension

Method: In our observational study, total 60 cases of osteoarthritis knee patients of either sex or age > 40 years included. The entire study was conducted in tertiary care center, Khandwa (M.P.). Our study conducted for a period of 1 year July 2019 to July 2020. Cases were selected as per the diagnostic criteria of the American College of Rheumatology. For the clinical severity, visual analog scale used. Severity of the disease graded radiologically by X-ray bilateral knee using K.L. grading system. Blood pressure was measured in both the arms via auscultatory method following American Heart Association guidelines

Result: The radiographic and symptomatically severity association between hypertension with the OA knee was found to be statistically significant. KL grading and VAS score both found to be higher in Hypertensive OA knee patients.

Conclusion: In conclusion our study demonstrates that people with hypertension have a higher risk of developing severe osteoarthritic changes. So the Modifiable risk factors of hypertension include unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, consumption of tobacco and alcohol, and being overweight or obese should be avoided and managed properly to further prevent severity of osteoarthritis knee.

KEYWORDS

Osteoarthritis; Osteoarthritis knee; Hypertension

Introduction

Osteoarthritis (OA) is the most common form of arthritis in various countries with significant impact on morbidity, quality of life and healthcare costs. Osteoarthritis is a common end stage phenotype of multifactorial etiology involving joint tissue as opposed to a single disease entity [1]. Some factors contributing to the increase of osteoarthritis are aging populations, and insufficient treatment to cope with or alter the course of this health condition [2]. Initially, it may appear that high blood pressure and osteoarthritis are unrelated; however it is more than a coincidence that many individuals are diagnosed with both conditions. Both are inflammatory conditions (Fernandes, 2015). Hypertension and osteoarthritis both conditions share common risk factors, in particular age and body mass index. However, the very high level of cooccurrence of both diseases cannot be accounted by common risk factors alone. [3]

Hypertension, is among the blood vessel disorders that is now thought to adversely affect the joints. In a study [4], several reasons have been described for this association: 1) blood vessels become narrowed over time 2) narrowed vessels causes restricted blood flow to the bone that lies beneath the joint cartilage 3) circulation of blood and nutrients to cartilage suffers, and 4) cartilage begins to deteriorate. Obesity is considered to be one of the most important risk factors of Osteoarthritis [5]-[7]. WHO initiative on counteracting obesity also accepts OA as a consequence of obesity [8] but the role of hypertension in OA knee still remains a mystery. The aim of this study was to investigate the association of hypertension with osteoarthritis knee severity with the clinico-radiological analysis.

Material method

In our observational study of knee OA, total 60 cases of osteoarthritis knee patients of either sex or age > 40 years were included. The entire study was conducted in tertiary care center, Khandwa (M.P.). Our study conducted for a period of 1 year July 2019 to July 2020. We use ACR criteria (American College of Rheumatology – ACR) to select cases: osteophytes on X-ray and any one or more of the following – Crepitus on knee range of motion; Age 40 years or older knee pain with short duration (<30min) morning stiffness.

Exclusion criteria: Secondary osteoarthritis knee, Rheumatic arthritis, traumatic osteoarthritis

Osteoarthritis The definition of lifetime osteoarthritis was any previous experience of osteoarthritis reported in the health survey

("Have you had any previous experience of osteoarthritis?") and that of chronic osteoarthritis, self-reported osteoarthritis accompanying pain symptoms lasting 3 months during the previous year ("Have you experienced osteoarthritis for 3 months or longer during the previous year?").

Hypertension Blood pressure was measured 3 times using a mercury sphygmomanometer with 25–35 cm cuff in a seated position with arm supported at heart level after a 10 minute rest. Measurements were recorded to the closest 2 mmHg on the manometer, and analyzed using the average of the 2nd and 3rd measurements. Hypertension was classified according to the AHA guidelines, which defines hypertension as a systolic blood pressure (SBP) of >130 mmHg or diastolic blood pressure (DBP) of > 80 mmHg.

History (including drug intake/ other inflammatory condition/trauma) was taken and thorough clinical examination of the affected joint and related regions was done. VAS score, X-ray bilateral knee – AP (standing), Lateral and skyline view was done to see the radiological changes of the disease to grade the radiological severity of the disease using K. L. grading system. Blood pressure was measured with Mercury manometer in both the arms by auscultatory method following American Heart Association guidelines [8].

RESULTS :

Table 1 Basic parameter

Parameters	N=60
Age	55.8yrs(45 - 78)
Hypertension	Y=38 (63.33%) N=22 (36.67%)
Sex	Male = 23 (38.33%) Female= 37(61.67%)
Knee involved	B/L=26 (43.33%) U/L=34 (56.67%)
BMI	Mean=27.56 kg/cm ² (18-32.5)
Family history of OA	Y=16 (26.67%) N=44 (73.33%)

Total 60 patients (M/F = 1/1.6) were studied with the mean age of 55.8 yrs with a negative family history of OA in 44 (73.3%) patients. Out of 60 patients with OA knee, 26 patients had bilateral knee involvement while in 34 unilateral patients knee involvement. The mean BMI was 27.56 kg/cm². (Table 1).

Table 2: Association of Clinical severity of OA knee with Hypertension

	BP	Normotensive N=22	Hypertensive N=38	P Value
VAS				
Less than 4		9(40.91%)	2 (5.27%)	<.0001
4 -7		8(36.36%)	17 (44.73%)	
8-10		5(22.73%)	19 (50%)	

We correlated hypertension with the clinical severity (VAS) and radiological severity (K.L grading) of OA knee. We found a significant association of hypertension with the clinical severity (VAS) and radiological severity (K.L grading) of OA knee. The mean VAS score was 7.12, 25 patients were in the scale of 4-7 out of which 17 were hypertensive, while 24 were in the scale of 8-10 out of which 19 were hypertensive, the mean VAS score of hypertensive and normotensive was 8.5 and 4.2 respectively (**Table-2**) There was a highly significant association between hypertensive OA knee patients with VAS between 8-10($p<0.0001$)

Table 3: Association of Radiological severity of OA knee with Hypertension

K.L grading/ B.P	Normotensive N=22	Hypertensive N=38	P Value
Grade 1	6 (27.27%)	7(18.42%)	<.0001
Grade 2	10(45.46%)	5 (13.16%)	
Grade 3	4(18.18%)	16(42.11%)	
Grade 4	2 (9.09%)	10(26.31%)	

As per the radiological severity in the K.L grading scale 20 patients were grade 3 out of which 16 patients were hypertensive (**Table-3**) There was a highly significant Association between hypertension and higher grade OAknee ($p<0.0001$).

Table -4 Mean BP of hypertension and normotensive

OA	Systolic BP	Diastolic BP
OA with HTN	154.2 mmhg	96.2 mmhg
OA without HTN	122.6 mmhg	76.4 mmhg

Out of 60 patients with OA knee, $n=38$ (63.33%) patients were hypertensive and rest 22 (36.67 %) patients were Normotensive with mean blood pressure of 154.2mm of Hg(Systolic blood pressure), 96.2 mm of Hg (Diastolic blood pressure) and 122.6 mm of Hg (Systolic blood pressure) and 76.4 mm of Hg (Diastolic blood pressure) respectively (**Table-4**).

DISCUSSION

Osteoarthritis (OA), a severe joint disease, is the 6th leading cause of disability worldwide and a major cause of restricted activity, disability, and low quality of life.[9]

The new classification for phenotyping OA, including metabolic syndrome, aging, and posttraumatic-related OA, has been certified by epidemiological studies.^[10]

Regarding the explanation for the associations between hypertension and knee OA risk, Hart et al^[6] found that metabolic factors such as hypertension, blood glucose, and hypercholesterolemia were associated with knee OA independent of obesity. This is similar to our study in which KL grade 3 and 4 were more in hypertensive patients. Similar study also done by Yi-min zhang (2017) cross-sectional studies with 9762 participants and the results showed that hypertension was significantly associated with higher radiographic knee OA[11]. Puenpatom and Victor^[12] reported that the component factors of metabolic syndrome (MetS), including hypertension, abdominal obesity, and hyperglycemia, were more prevalent in the population with OA than in that without OA.^[13] OA and MetS share the same mechanisms of inflammation, obesity increased mass and joint load and altered proinflammatory factor adipokines secretion, leading to the chronic low grade inflammatory status in joint tissues. Additionally, cholesterol accumulation in the cartilage can impair the efflux function of cartilage, hence inducing OA.^[14,15]

However, the precise mechanism of this relationship is unclear. Hypertension and OA are both highly prevalent diseases. Some studies suggest that there may be several shared risk factors implicated in the plausible mechanisms of the relationship between hypertension and knee OA.^[16,17] One possible explanation for the relationship between hypertension and knee OA is shared traditional risk factors, such as

aging, obesity, and chronic inflammation^[18,19]. Moreover, some studies have proven that multiple genes are involved in both hypertension and knee OA. The proinflammatory cytokine interleukin-6 plays an important role in hypertension and knee OA.^[20,21] In addition, some various studies showed that polymorphisms in the vitamin D receptor may be associated with low bone mineral density, OA, and hypertension.^[22,23,24,25]

Dahaghin *et al*(2007), while studying 3,585 patients with osteoarthritis of the hand, found that osteoarthritis of the hand was increasingly common when overweight occurs together with hypertension and diabetes and concluded to be significantly true relationship, when occurred at a relatively patients of younger age[26]. Similar in our study out of 36 hypertensive patient 26 were high grade osteoarthritis .

Another similar study by *Ishaan Vohra et al* (2015) found statically significant correlation between hypertension and osteoarthritis in 120 patient study. Also According to Singh *et al*(2002), the OA and hypertension frequently coexist in the same patients.[27] in our present study we also found hypertension with the severity of OA knee has statically significant association. So early and effectively blood pressure control could be important in preventing the development of primary osteoarthritis. small sample size was the limitation of the present study.

CONCLUSION

our study to show elevated systemic blood pressure is associated with increased prevalence of knee OA and greater levels of knee pain. So Modifiable risk factors of hypertension include unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, consumption of tobacco and alcohol, and being overweight or obese should be avoided and managed properly to further prevent severity of osteoarthritis knee. These findings suggest a new and promising avenue for research on disease modification as well as symptom control in knee, due to small sample size Future studies are needed to confirm these findings.

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